

Watson (Jr. S.)

DIAGNOSIS AND SURGICAL TREATMENT

OF

EMBOLISM AND THROMBOSIS OF THE
MESENTERIC BLOOD-VESSELS.

With Reports of Cases.

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THE DIAGNOSIS AND SURGICAL TREATMENT
OF CASES OF EMBOLISM AND THROMBOSIS
OF THE MESENTERIC BLOOD-VESSELS, WITH
REPORTS OF CASES.¹

BY FRANCIS SEDGWICK WATSON, M.D.,

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IN the *Boston Medical and Surgical Journal* of April 26, 1894, Prof. W. T. Councilman reported three cases of occlusion of the superior mesenteric artery.

Two months later Dr. J. W. Elliot mentioned to me a case on which he had operated for intestinal obstruction, in which the patient died, and the autopsy showed thrombosis of the mesenteric artery.

Two days later a woman fifty years of age entered my service at the Boston City Hospital, with the following history: For several years she had had attacks of dyspnea and palpitation. One week previous she was seized with violent colicky pains in the abdomen, which were not localized. This pain persisted intermittently for five days, then became localized in the right iliac fossa and diminished in severity. There had been no passage of feces or flatus since the beginning of the attack. Vomiting began two days before entrance, and has persisted ever since. There had been gradually increasing abdominal distention from the first.

When received at the hospital, the patient was conscious. Her face and extremities were cold, cyanotic, and covered with cold sweat. The abdomen was greatly distended and universally tympanitic. The

¹ Read before the Surgical Section of the Suffolk District Medical Society, November 7, 1894.

pulse was 120°, weak, thready and irregular. Temperature subnormal.

Operation.—A median incision was made below the umbilicus, three inches long, and subsequently extended to six inches. A portion of the enormously distended ascending colon immediately protruded through the wound. The whole of the ascending colon was glued lightly to the parietal peritoneum by recent adhesions, which were easily separated by the hand. There was about a pint of dark bloody serum free in the peritoneal cavity. The ascending colon was deeply congested; and in places beneath its serous surface there were hemorrhagic extravasations, from a point two inches above the cecum to its junction with the transverse colon. Scattered over the same area were about a dozen spots of beginning gangrene, varying in size from a quarter of a dollar to a ten-cent piece. A few gangrenous spots were situated in the mesentery at its junction with the bowel. The cecum and vermiform appendix presented a perfectly normal appearance. A portion of the ascending colon close to the cecum was drawn out of the wound, and a small incision was made into it, through which a great quantity of the intestinal contents (which was fluid and of normal color) was evacuated, and the gut was rapidly flushed with hot water.

The collapsed colon was then drawn through the wound and examined throughout its entire length. The most careful search failed to show any constriction, or other of the usual causes for intestinal obstruction or gangrene; and I then concluded that I had to do with a case of occlusion of the mesenteric vessels. On carefully examining the mesentery supplying the ascending colon, I found near its base, in the middle portion, a thickened area in which there could be distinctly felt between the thumb and finger,

hard, round, elongated masses, some of which were about the size of a slate-pencil; which I believed to be branches of the superior mesenteric artery or vein occluded by thrombi. The lines of demarcation at either end of the diseased part of the bowel were well defined, and I wished to excise the part of the gut between them; but at this point the patient's condition became so alarming that I hastily made an artificial anus and abandoned the thought of any further surgical interference. The patient lived for five days, on the third day there was discharge of feces by the rectum; and on that and the following day the patient seemed to rally somewhat in strength. On the fifth day the temperature, which had been subnormal throughout, suddenly rose, and the patient died. An autopsy was not permitted. There was no vomiting or pain after the operation.

Although not positively demonstrated by post-mortem examination, I think it may be fairly assumed that this was a case of occlusion of the mesenteric vessels with the resulting intestinal lesions.

A few days after this case another one came to Dr. J. W. Elliot, in which he not only recognized the condition, but also saved the patient's life by what, I think, may be properly called a brilliant surgical achievement, thereby marking, so far as I can learn, the first successful result of surgical intervention in this disease. Previous to my case, one occurred in the hands of my colleague, Dr. Abner Post, at the Boston City Hospital, and within the last few days, Dr. D. W. Cheever has had still another.

An examination of the records of the Boston City Hospital for the past ten years, for which I am indebted to the kindness of Drs. Stokes and Dennett, furnishes three more examples of thrombosis of the mesenteric artery in which the lesion was clearly

demonstrated, and three others in which it was not demonstrated, but was probably overlooked, inasmuch as the intestinal conditions which have been seen in all the proved cases were present in these last ones also, and no other cause was discovered to which they could be referred.

We have, then, a series of fourteen cases, in ten of which the condition was demonstrated accurately, occurring here in Boston within the past eight years (eight of them observed within the past year), through which can be traced an interesting progress from the record of the pathological anatomy in the autopsy-room to the clinical recognition of the disease at the time of operation, and finally to the saving of a patient's life in the surgical amphitheatre by the remarkable operation of Elliot.

The first satisfactory description that I have found of the pathological anatomy of this condition is that of Virchow in his *Gesamt. Abhandlungen*. He published, I think in 1858 or 1859, an account of the post-mortem appearances in three such cases. In the hospital records and literature accessible to me, I have found reports of 52 cases, occurring between that time and the present, of occlusion of the mesenteric arteries or veins by emboli or thrombi, in all of which there are accurate records of the pathological conditions; to 27 of this number are attached clinical histories sufficiently satisfactory to permit of drawing inferences from them. These latter I have analyzed with only two objects in view: First, as to the possibility of making the diagnosis; and second, as to the chance of saving life by surgical operation. In order to assist in following this analysis, the cases are here presented in the following order: (1) Cases of embolism or thrombosis of the superior mesenteric artery, with clinical histories; (2) Of the mesenteric veins, with clinical histories; in all, 27 cases.

CASES OF THROMBOSIS, OR EMBOLISM, OF THE SUPERIOR MESENTERIC ARTERY.

CASE I. Cohn.² Woman, aged forty-five years. The only intestinal symptom mentioned is diarrhea. Pneumonia and pleurisy supervened.

Autopsy. — The colic branch of the superior mesenteric artery was entirely occluded by an embolus. Infarction of the transverse colon. Mitral disease. Old coagulum in the left ventricle. Pleurisy and pneumonia of the left side.

CASE II. Cohn.² Man, aged twenty-eight years. Diarrhea is the only intestinal symptom mentioned. Patient had syphilis and Bright's disease.

Autopsy. — Branches of the superior mesenteric artery supplying the lower portion of the ileum firmly plugged by adherent coagula. Infarction of the last foot of the ileum. Atheroma of the aorta. Heart normal.

CASE III. Oppolzer.³ Male, aged fifty years. Suddenly seized with violent colicky abdominal pain, not localized. This was followed shortly by vomiting and a profuse bloody diarrhea. Old cardiac disease was present.

Autopsy. — Main trunk of the superior mesenteric artery totally occluded by an embolus two inches long. Infarction of the bowel from the middle of the duodenum to the middle of the transverse colon. The mucous membrane of the intestine swollen and softened. Stenosis of the mitral valve, and coagulum in the left ventricle.

CASE IV. Kussmaul.⁴ Male, aged twenty-six years. Was suddenly attacked, in the course of car-

² Klinik. der Gefäßkrankheiten, p. 548.

³ Allg. Wien. Med. Ztg., 77-88, 95-103, 1862.

⁴ Würz. Med. Zeitsch., v. v, 210-220, 1864.

diac disease and empyema, with profuse bloody diarrhea. Subnormal temperature followed, and death thirty-six hours later.

Autopsy. — Branches of the superior mesenteric artery supplying the jejunum totally occluded by hard adherent thrombi extending into the peripheral arteries. Infarction of the lower part of the small intestine. The mucous membrane of its lower portion deeply injected and showing small necrotic areas. Hemorrhagic peritonitis, hemorrhagic extravasations into the mesentery. Peri-myocarditis, empyema, Bright's disease. Infarctions of both kidneys and spleen.

CASE V. Pieper.⁵ Male, aged thirty-eight years. Was suddenly attacked with violent colicky abdominal pain, not localized, preceded a few hours before by profuse vomiting and bloody diarrhea. These symptoms appeared on the seventeenth day of an acute rheumatism, on the eleventh day of which endocarditis developed. One day later the patient died.

Autopsy. — The main trunk of the superior mesenteric artery was totally occluded by a firm adherent coagulum. Infarction of the whole small intestine, and of the large intestine as far as the transverse colon. Intestinal contents bloody. General peritonitis. Infarction of the spleen.

CASE VI. Moos.⁶ Male, aged nineteen years. On the eighteenth day of an acute rheumatism was suddenly attacked by a profuse bloody diarrhea, followed shortly by violent colicky pains (not localized), and by gradually increasing abdominal distention. Temperature subnormal. There was evidence of widespread embolism in other parts of the body at the same time. The patient recovered at the end of eight weeks.

⁵ All. Med. Cent. Ztg., v. xxxiv, 493-496, 1865.

⁶ Virchow's Arch., v. xli, p. 62.

CASE VII. Zenker.⁷ Male, aged thirty-nine years. Amputation of the right leg for injury July 19, 1869. Died November 17th. Septicemia followed the amputation. During the last three days there was occasional vomiting, but no other abdominal symptom.

Autopsy. — Infarction of a portion of the small intestine. The branch of the superior mesenteric artery supplying this area was totally occluded by a hard, adherent embolus. Thrombosis of both femoral veins. Septic abscesses in left arm and right thigh.

CASE VIII. Baumler.⁷ Male, aged sixty-one years. Had chronic heart and renal disease. Five days before death began to vomit. Three days before death abdominal distention and subnormal temperature.

Autopsy. — Three and one-half centimetres from its origin the superior mesenteric artery was totally occluded by a coagulum fourteen millimetres long; from it a prolongation extended three millimetres into one of the branches of the vessel. There were two branches given off from the artery between its origin and the embolus, which were free from emboli.

CASE IX. Concato.⁸ The patient was suddenly attacked three days before death with violent colicky pain and tenderness in the epigastrium, which persisted until death. There were no other abdominal symptoms except slight distention. Temperature subnormal.

Autopsy. — Several of the branches of the superior mesenteric artery were totally occluded by thrombi. Infarction of the small intestine from the upper part of the jejunum downwards. The contents of the bowel were bloody. The peritoneal cavity contained a considerable quantity of foul, dark fluid. Atheroma

⁷ Deutsch Arch. für klin. Med., v. xvi, p. 527, 1875.

⁸ Rivista Clinica del, 1866.

of the abdominal aorta, with several thrombi on its walls.

CASE X. Mary Putnam.⁹ Woman, aged thirty-five years. Was suddenly attacked with copious diarrhea; the stools were tarry. A few days later she had violent colicky abdominal pains, not localized, followed two hours later by vomiting, and two days later by abdominal distention. Death occurred three days after the appearance of pain.

Autopsy. — Gangrene of the last two feet of the ileum; the mesentery of this portion of the bowel was thickened, and contained extravasations of blood. Numerous hard bead-like bodies were felt in the mesentery near its intestinal attachment. The blood-vessels were not, however, thoroughly examined.

CASE XI. Howse.¹⁰ Woman, aged forty-eight years. There were two attacks of abdominal pain some months before the present illness. The latter began with severe pain in the right hypochondrium, but it lasted only a short time. Vomiting followed soon after, and also diarrhea, which was profuse but not bloody, and continued till death, three weeks later. Abdominal distention was present throughout the illness. The temperature ranged from 99° to 102° F. There was gangrene of the left foot.

Autopsy. — The main trunk of the superior mesenteric artery was totally occluded by a firm thrombus which extended into the aorta downward. The aorta above was healthy. Extensive ulcerative processes of the mucous membrane of the lower part of small intestine and first part of the ascending colon. Peyer's patches were not implicated in this process. There were two fistulous communications between separate parts of the intestines, and they were not of recent

⁹ New York Medical Record, vol. vii, p. 208.

¹⁰ Transactions Pathological Society, London, vol. xxix, p. 101, 1878.

formation; one was between a loop of small intestine and the ascending colon, the other between small intestine and descending colon. Some of the branches of the superior mesenteric artery were occluded to their terminations with thrombi.

CASE XII. Aronshon.¹¹ Male, aged forty-five years. Was seized with sudden violent pain in the epigastrium; this ceased in two days. Eight days later he had a similar attack accompanied by dyspnea and cyanosis; these symptoms lasted four days. There was no vomiting or diarrhea. The abdomen was slightly distended. Temperature 100°. Chronic cardiac disease and edema of the lungs. Death on the twelfth day.

Autopsy. — Superior mesenteric artery, and its branches as far as the intestine, were occluded by thrombi. Embolism of one of the arteries of the brain. Infarction of jejunum and ileum. The pelvis contained a considerable quantity of bloody fluid. Edema of lungs. Hypertrophy of left and dilatation of right side of the heart.

CASE XIII. McCarthy.¹² The patient was attacked suddenly with violent pain in the right hypochondrium; the pain persisted for six days. Vomiting, obstipation and abdominal distention were present throughout the illness. Laparotomy was performed for the relief of intestinal obstruction, which was secured by making an artificial anus. The patient died shortly afterward.

Autopsy. — The main trunk of the superior mesenteric artery was occluded by an embolus originating in a thrombus in an atheromatous aorta.

CASE XIV. Hahn.¹³ Male, aged fifty-six years. Suddenly attacked with vomiting, followed by severe

¹¹ Gaz. Des. Hôp., September 1, 1868, No. 102, p. 406.

¹² London Lancet, March 22, 1890.

¹³ Dissertation, Munich, 1889.

epigastric pain which continued until death. There was no diarrhea, constipation or abdominal distention. The abdominal walls were soft and natural. Cardiac and renal disease were present. Death in one day.

Autopsy showed embolism of the superior mesenteric artery.

CASE XV.¹⁴ Male, aged seventy-eight years. Chronic cardiac and renal disease. Died without having any abdominal symptoms whatever. Temperature normal. The patient was under observation for three days. He was brought to the hospital unconscious, after having fallen in the street. He regained consciousness a few hours later.

Autopsy. — Totally occluding thrombus of the principal branches of the superior mesenteric artery. Hemorrhagic infarction of the small intestine. Fifty centimetres of ileum above the ileo-cecal valve was dark red in color, covered with patches of shreddy membrane. The intestinal walls much thickened. Mucosa hemorrhagic, and showing small spots of superficial necrosis. Hemorrhagic infarction in right kidney, hydronephrosis of left kidney, chronic interstitial nephritis. Chronic lepto-meningitis, endarteritis of cerebral vessels. Acute endocarditis. Chronic emphysema of lungs.

CASE XVI.¹⁵ Male, aged sixty-one years. Twelve days after the beginning of senile gangrene of the feet the patient was suddenly attacked with violent colicky abdominal pains, not localized. The pain continued until death. One day later there were no other abdominal symptoms. Temperature subnormal.

Autopsy. — Embolus of the superior mesenteric artery. Infarction of the whole of the small intestine, most marked in the upper part of the jejunum.

¹⁴ Boston City Hospital Records (not published), June 17, 1887.

¹⁵ *Ibid.*, vol. xxv, p. 222 (not published).

Thrombus in mesenteric artery began four centimetres from the aorta and extended throughout the branches almost to the intestines. General peritonitis. Thrombi in the aorta. Embolism of the femoral artery. Old and recent infarction of kidneys.

CASE XVII. Grawitz.¹⁶ The patient had short periods of unconsciousness and vomiting.

Autopsy showed embolism of the superior mesenteric artery.

CASE XVIII. Kaufman.¹⁷ Violent colicky abdominal pains, not localized.

Autopsy showed embolism of the superior mesenteric artery. Atheromatous aorta. Endocarditis. Thrombi in the heart.

CASE XIX. Moyers.¹⁸ A patient with cardiac disease was suddenly seized with violent colicky abdominal pains, hematemesis and diarrhea.

Autopsy showed embolism of the superior mesenteric artery.

CASE XX. Osler.¹⁹ Woman, aged fifty-five years. Suddenly attacked with violent abdominal pain, not localized. Vomiting soon followed, and persisted till death, finally becoming fecal. Tympanites was present. Death one week after onset of attack.

Autopsy. — Thrombosis of the superior mesenteric artery, totally occluding its orifice. Hemorrhagic infarction of jejunum and ileum.

CASE XXI. Osler.¹⁹ Woman, aged seventy-five years. Suddenly attacked with severe abdominal pain, not localized. Frequent vomiting and diarrhea; the latter lasted but a short time, and was followed by obstipation and abdominal distention.

Autopsy. — Embolism of the superior mesenteric artery. Infarction of the small intestine, involving

¹⁶ Virchow's Arch., Bd. 110, p. 434.

¹⁷ Ibid., Bd. 116, p. 353.

¹⁸ Glasgow Medical Journal, 1880, vol. xiv, p. 484.

most of the ileum and jejunum. Recent warty vegetations on the heart.

CASE XXII. Osler.¹⁹ Male, aged forty years. Suddenly attacked with violent abdominal pains, not localized. Vomiting and diarrhea soon followed; the stools were tinged with blood. Tympanites appeared later. Death at the end of one week.

Autopsy.—Superior mesenteric artery was blocked for half an inch of its main trunk by a fibrinous clot, which extended into the artery from an aneurism of the aorta, from the sac of which the superior mesenteric artery had its origin.

CASE XXIII. Councilman.²⁰ A woman, eighty-five years old, was attacked with moderate abdominal pain, which after a few hours became intense, and was localized in the right iliac fossa. This pain persisted throughout the illness. Vomiting began on the fourth day and continued until death, finally becoming fecal. There was complete intestinal obstruction throughout the illness. The abdomen was distended after the second day. Subnormal temperature until the eighth day; it then rose to 101.5°. Fatty degeneration of the heart, and lobular pneumonia were present. Death on the twelfth day.

Autopsy.—Thrombosis of the superior mesenteric artery, extending from a thrombus of the aorta which arose from a rough calcified plate on the surface of the aorta near the origin of the superior mesenteric artery. The extension of the thrombus into the latter vessel was short, and did not absolutely occlude its lumen; the rest of the vessel and its branches were free. The intestines were distended and but moderately congested. There was no intestinal infarction.

CASE XXIV. Councilman.²⁰ A man, sixty-one

¹⁹ Practice of Medicine, 1893, p. 404.

²⁰ Boston Medical and Surgical Journal, April 26, 1894.

years old, with senile gangrene of the feet, had general, slowly increasing abdominal pain two days before death.

Autopsy.—The superior mesenteric artery was occluded by an embolus arising from a thrombus formed on a calcified plate in the atheromatous aorta, near the origin of the superior mesenteric artery. Hemorrhagic infarction of the entire small intestine; necrotic areas on its mucous membrane. Thrombosis of the femoral arteries, and embolus and infarction of the kidneys.

CASE XXV. Councilman.²⁰ A man, sixty-two years old, was suddenly attacked with violent general abdominal pain and tenderness which increased until death. There was no vomiting. Diarrhea for eight days before death. Temperature was slightly elevated. Cardiac symptoms had been present for eight months previous. The patient died on the eighth day after the appearance of the abdominal pain.

Autopsy.—Total occlusion of the superior mesenteric artery, at its origin, by a thrombus, which probably originated in an atheromatous aorta—infarction of small intestine—cardiac hypertrophy and insufficiency of the aortic valves.

CASE XXVI. Munro.²¹ A man, fifty-one years old, felt pain in the lower abdomen after lifting a heavy weight, and soon afterward passed blood per rectum. This was succeeded by colicky pain in the abdomen. Constipation followed for one week. Pain was the first symptom, and was referred to the region of the transverse colon. Vomiting was present during most of the illness, and finally became fecal. A large, hard mass could be felt in the left iliac region. Temperature subnormal. Laparotomy was performed at the end of three weeks. The hard mass in the left

²¹ Lancet, January, 1894, p. 148.

iliac region was seen to be thickened, and the mesentery contained hemorrhagic extravasations. In the description of the operation it is not clear what was done, if anything, beyond opening the abdomen.

Autopsy. — Embolism of the inferior and superior mesenteric arteries. Infarction of the small intestine and its mesentery, also of the descending colon and sigmoid flexure.

Including the author's, the whole number of cases is 27. A study of these cases gives the following results :

Pain occurred as the first symptom, or coincident with vomiting or diarrhea, in 18 cases. In all but three of these it was violent, paroxysmal, colicky, abdominal pain, not localized definitely. In two cases it was localized in the epigastrium, and in one in the right iliac fossa. In most of the cases the pain continued throughout the illness. Pain was absent in four cases, and not noted in five cases.

Diarrhea occurred as an early symptom in 14 cases. It was bloody in seven of these. There was no diarrhea or other disturbance of the bowels in six cases. Obstipation was present in five cases. No observation is recorded in two cases.

Vomiting occurred as the first symptom, or as closely following the abdominal pain, in 14 cases; in 2 of these it was bloody, and in 3 it was fecal. In most of these cases it was persistent, and continued during most of the illness. There was no vomiting in 6 cases, and there is no record about it in 7.

Abdominal Distention occurred in 12 cases, appearing a day or two after the beginning of the illness and gradually increasing. There was no distention in 4 cases, and there is no record of it in 11.

Temperature was subnormal in 11 cases, elevated in 4, not recorded in 13.

Preceding or Coincident Diseases in 16 cases. In 9 of these cardiac and (or) renal disease was noted during life; pneumonia and pleurisy in 2; gangrene (senile) of feet in 3; pyemia in 1; acute rheumatism in 1. There was evidence of embolism elsewhere in but 5 cases during life.

Age.—The cases occurred at the following ages:

Between 10 and 20	1 case
Between 20 and 30	2 cases
Between 30 and 40	3 cases
Between 40 and 50	4 cases
Between 50 and 60	5 cases
Between 60 and 70	4 cases
Between 70 and 80	2 cases
Over 80	1 case

Sex. — There were 14 males and 7 females. Six cases not noted.

Autopsies show that the source of the embolus or thrombus, has been the heart or the atheromatous aorta in 15 cases, an aneurism of the aorta in 1. Undetermined or not noted in 9. There was no autopsy in 2.

Total Occlusion of the main trunk of the superior mesenteric artery occurred in 8 cases. It is interesting to note the symptoms in connection with these particular cases. In the first case there was hemorrhagic infarction of almost all the small intestine. The patient, however, *had no abdominal symptoms* whatever. Duration of the illness was three days. In the second case there was infarction of the jejunum and the ileum. Slight tympanites and epigastric pain were the only abdominal symptoms. In the third case there were fistulous communications between the intestines in two places, which were not of recent formation, and an ulcerative process of the mucous membrane of a part of the small intestine. The abdominal symptoms in this case were pain, vomiting, diarrhea

(but not bloody), and abdominal distention. In the fourth case there was infarction of almost all the small intestine. The attack came on gradually, vomiting and abdominal distention were the only symptoms. In the fifth case there was infarction of all the small intestine and of the large intestine as far as the transverse colon. General peritonitis. The abdominal symptoms were violent colicky pains, vomiting and bloody diarrhea. In the sixth case there was infarction of the small and part of the large intestine. The abdominal symptoms were violent pain, vomiting and profuse bloody diarrhea. In the seventh case there was infarction of all the small intestine and general peritonitis. The only abdominal symptom was acute, colicky pain. In the eighth case there was hemorrhagic infarction of the whole of the small intestine. Abdominal pain and diarrhea were the only symptoms.

It will be noticed that in one case there was entire absence of abdominal symptoms, and that in two others they were very slight, but that in all but one of these cases of total occlusion of the main trunk there was infarction of a very great part of the intestines; whereas in another case in which only the branches of the vessels supplying a part of the ileum and jejunum was plugged, and in which but a short distance of the small intestine was involved in an infarction, there were nevertheless sudden violent abdominal pains and profuse bloody diarrhea. Other examples of the same combination as in the last case are to be found; in other words, the plugging by an embolus of one of the smaller branches of the artery with a comparatively slight intestinal lesion as a consequence, may produce as severe and as many (or more) abdominal symptoms as when the main trunk of the vessel is occluded, and may lead to a more speedily fatal termination. So that it is impossible to discriminate clinically

as to the extent, or even probable location, of the occluding body, even if it be possible to make a fairly accurate diagnosis as to the nature of the trouble itself.

Before speaking further of diagnosis, I wish to add the reports of three cases of

THROMBOSIS OF THE SUPERIOR MESENTERIC VEIN.

CASE I.²² Female, age 34. Confined one month previous to attack. Ten days before, had phlegmasia of the left leg, which subsided in a week; then the right leg was similarly affected. Nine days before attack, she had a troublesome diarrhea. She was attacked, one month after confinement, with violent pain in abdomen — paroxysmal, colicky, not localized; vomited viscid, blood-stained fluid in small quantities; collapse; was conscious; six hours later pain almost ceased, and patient improved; abdomen soft and natural, no tenderness anywhere, no tympanites, nothing to be felt; a few hours later pain returned and she died — twelve hours after attack began.

Autopsy. — The jejunum was of a dark-purple color. The congestion extended a short distance into the mesentery; the congested area was sharply limited above and below, the rest of the digestive tract being healthy. There was no distention of any part of the bowel. The heart, aorta and mesenteric arteries were normal. The branches of the mesenteric vein coming from the affected portion of the intestine, and for a short distance beyond either end of it, were occupied by firmly adherent, hard thrombi, extending throughout the entire course of the vessels. The thrombi could be felt as hard masses lying in the mesentery to within an inch or two of the bowel. The femoral veins were plugged by recent thrombi.

²² Fagge : Trans. Path. Soc., London, 1876, vol. xxvii, p. 124.

CASE II.²³ A young girl, who was in the hospital for an abscess of the neck, developed erysipelas. A few days later she was seized with violent epigastric pain, and died in a few hours.

Autopsy. — Thrombosis of the superior mesenteric vein and its tributaries. Hemorrhagic infarction of the intestine throughout the area of the vein's distribution.

CASE III.²⁴ A woman, aged fifty. For a year she had had renal and cardiac symptoms: Edema of the feet and of the face, vomiting, dyspnea, palpitation and frequent urination. The patient entered the hospital December 11, 1886. Two weeks previous the abdomen became distended and has increased steadily in size since. Examination showed cardiac hypertrophy and tricuspid regurgitation. The urine contained granular and hyaline casts and one-eighth per cent. of albumin. There was a well-marked anasarca. There had been marked constipation for two or three weeks; the bowels could be moved by cathartics with difficulty. Two days after admission, four quarts of ascitic fluid were withdrawn by trocar. Three days later, Cheyne-Stokes respiration and constant vomiting of dark-brown fluid took place. Pulse 180. Patient became comatose two days later, and died on the eighth day after admission, and in an uremic convulsion.

*Autopsy.*²⁵ — Hypertrophy and dilatation of heart. Venous engorgement of the lungs, liver and spleen. Thrombosis of portal vein and its branches. Ascites. Hemorrhagic infarction and necrosis of jejunum; 50 centimetres of the jejunum was of a dark-red color and covered with a recent fibrinous false membrane.

²³ McWeeney: *Lancet*, December 23, 1893.

²⁴ Boston City Hospital Records (not published), vol. ccl, p. 228.

²⁵ Medical Records, Boston City Hospital; vol. ix, p. 188, vol. ccl, p. 226 (not published).

The mucous membrane was greatly thickened, very dark in color, and showed occasional necrotic areas. The mesentery was much thickened. A firm thrombus occupied the junction of the superior mesenteric and splenic veins, nearly occluding their lumen, and extending into them. The peritoneal cavity contained about one litre of clear fluid.

Of these three cases, two were of more violent character and of more rapid course than any of those in which the artery was involved.

There are two recorded cases of embolism of the inferior mesenteric artery; but I do not find that they present any symptoms which serve to differentiate them from the others, although it has been stated that this class may be distinguished from those of the superior mesenteric vessels by the presence of fresh blood in the dejections and by the localization of pain in the lower part of the abdomen. The number of observations of embolism of the inferior vessel seems too few to allow this inference.

With regard to the diagnosis there are certain symptoms which when associated, are fairly, though not positively, characteristic. They seem to me to be, in the order of their importance, as follows: (1) Colicky, very intense, not definitely localized, abdominal pain. (2) Bloody diarrhea. (3) Subnormal temperature. Vomiting if present (and next to pain it is the most frequent symptom) strengthens the diagnosis, as do also abdominal distention and marked prostration; but the first two or first three symptoms, when occurring in combination, are the only ones that can be called in any sense characteristic. Pain is the first symptom more often than any one other, and its intense character is dwelt on by several authors.

Gerhardt and Kussmaul speak of the evidence of embolism elsewhere in the body as one of the symptoms

essential to making the diagnosis. When present it is, of course, of great value, but as already pointed out, it occurred in but few of the cases enumerated here (in eight). The coexistence of cardiac disease and atheromatous arteries is also affirmatory in connection with the important symptoms mentioned. There remains a considerable number of cases in which there are no well-marked abdominal symptoms; in these it is impossible to make a diagnosis. In about one-quarter of the cases the symptoms are seen to be sufficiently characteristic to warrant the diagnosis. In none could the extent of the intestinal lesion or the situation of the thrombosis or embolus have been determined without surgical exploration of the abdomen.

SURGICAL OPERATION.

(1) In about one sixth of the cases the autopsy showed that the intestinal lesion was sufficiently limited and well defined to allow of a successful resection of that part of the bowel.

(2) In the majority of cases there are coexisting diseases, most frequently cardiac or renal, or atheromatous arteries, and most of the patients are beyond middle life.

(3) There is, on the other hand, a small minority of cases of individuals below middle life, in whom the source of the embolus, or cause for thrombosis, is obscure or undiscoverable, in whom no serious disease of other organs can be detected.

(4) Practically, all patients die when left to themselves or under any form of medical treatment.

From the above considerations it may be concluded that laparotomy is indicated in all cases in which the symptoms suggest the nature of the disease, and in which the patient is not too greatly prostrated or has not some other fatal disease. There will probably oc-

cur a few in which the local and general conditions of the patients are favorable to success. Where a not too extensive portion of the gut is involved, and if it be possible to do so, resection of the diseased part should be practised ; otherwise an artificial anus should be made, and if the patient survives, the cut ends of the bowel may be united subsequently. That this is actually possible, is shown in the remarkable case of Elliot's which he is to report to-night, in which he successfully resected about four feet of the small intestine.

In conclusion, and to show the possibility of survival after total obliteration of the main trunks of the mesenteric arteries, the following case is appended :

John Chiene.²⁶ Female, age sixty-five, a dissecting-room subject. The vessels were injected from the femoral. The branches of the celiac and mesenteric arteries were found to be filled with the injection, but their main trunks were totally occluded as far as their first branches by an old embolic process which evidently dated back for a considerable period. There was an aneurism of the lower abdominal aorta, from the sac of which the lower mesenteric artery sprang. The celiac axis was converted into a hard fibrous cord for its first half inch ; beyond this point the branches were free. Both mesenteric arteries were obliterated at their origins, but their branches were filled with the injection through the superior hemorrhoidal, which was as large as the femoral. The blood reached the superior mesenteric through the left and middle colic arteries, which were double their natural size. The extra- and retro-peritoneal plexus of the ordinarily small arterial vessels was enormously enlarged, and served as the channel of communication between the internal iliacs and the mesenteric arteries ; this plexus

²⁶ *Journal Anatomy and Physiology*, Edinburgh, vol. iii, p. 65, 1868.

ran along the sides and posterior surface of the rectum. The author states that this is probably the only recorded case of obliteration of the main trunks of the three anterior branches of the abdominal aorta supplying the viscera, and the subsequent establishment of collateral circulation. The author concludes as follows: "This case confirms the view that between the visceral and parietal branches of the abdominal aorta there exists a free communication through the sub- or extra-peritoneal plexus of arteries, as described by Professor Turner in 1863. Enlargement of this system of arteries in the abdomen and pelvis may take place to such an extent as to become the channel of blood-supply to the abdominal viscera when their main arterial trunks are obliterated."

This article of Chiene's deserves careful study in the original.

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